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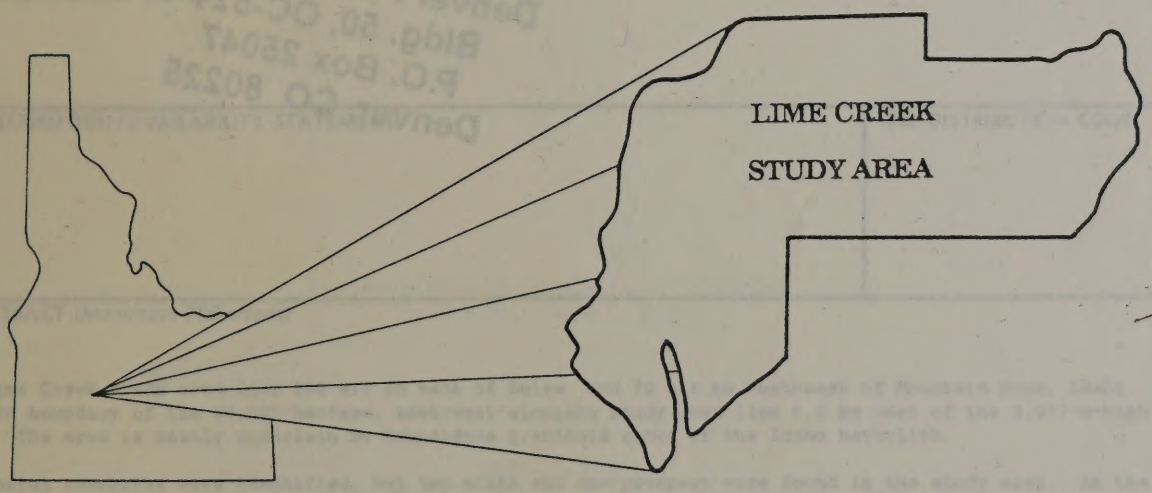
Mineral Resource Investigation of the Lime Creek Study Area, Camas and Elmore Counties, Idaho



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The Lime Creek study area lies 100 air km east of Boise, and 70 air km northeast of Mountain Home, Idaho. The eastern boundary of the 28,000-hectare, east-west-elongate study area lies 0.2 km west of the 3,077-m-high Smoky Dome. The area is mainly underlain by Cretaceous granitoid rocks of the Idaho batholith.

No mineral resources were identified, but two mines and one prospect were found in the study area. At the President and the Last Chance mines, in the southwest corner of the study area, gold mineralization occurs along steeply dipping east-northeast-trending faults and associated quartz veins, and within adjacent Cretaceous granitic rock. The mineralized material is not rich enough to mine underground, and near surface, open-pit-mineable deposit areas could not be identified. The third prospect, the Ventura, is within altered pink granite of probable Tertiary age, but metal concentrations are very low.

Geothermal activity was not observed within the study area, but hot springs do occur in the vicinity. Bedrock observed is only suitable for the most basic high bulk and low end value applications, such as crushed aggregate. Numerous sources for crushed stone occur closer to markets. Alluvial concentrate (placer) samples did not contain free gold, and no substantial alluvial bars were seen; deposits were too small to contain resources.

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MINERAL RESOURCE INVESTIGATION OF THE LIME CREEK STUDY AREA, CAMAS AND ELMORE COUNTIES, IDAHO

By
Thomas J. Peters

Western Field Operations Center
Spokane, Washington

MLA 13-93

UNITED STATES DEPARTMENT OF THE INTERIOR
Bruce Babbitt, Secretary

BUREAU OF MINES
Hermann Enzer, Acting Director

PREFACE

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Bureau of Mines and U.S. Geological Survey to survey certain areas of Federal lands ". . . to determine the mineral values, if any, that may be present . . ." Results must be made available to the Public and be submitted to the President and the Congress. This report presents the results of a Bureau of Mines mineral investigation of the Lime Creek study area, Camas and Elmore Counties, Idaho, which includes lands that had been recommended for Wilderness. Mining-related activities in the study area would be severely restricted under Wilderness designation.

This open-file report contains data gathered and interpreted by personnel of the U.S. Bureau of Mines, Western Field Operations Center, Branch of Resource Evaluation, East 360 Third Avenue, Spokane, WA 99202. This report has been approved by the Branch of Mineral Land Assessment, Washington, D.C.

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UNITS OF MEASURE, ABBREVIATIONS, SYMBOLS, AND CONVERSIONS USED IN THIS REPORT

Metric Units

cm	centimeter (cm_3 x 0.3937 = inch)
m^3	cubic meter (m^3 x 1.3079 = yd^3
g	gram (g x 0.029 = oz)
ha	hectare (ha x 2.471 = acre)
<	less than
m	meter (m x 3.28 = ft)
t	metric ton (tonne) (t x 0.9072 = ton)
kg	kilogram (kg x 2.205 = lb)
km	kilometer (km x 0.6214 = mi)
mg	milligram (mg x 0.0000322 = oz)
ppb	part per billion
ppm	part per million
%	percent

English Units

yd^3	cubic yard
ft	foot
mi	mile
lb	pound
ton	short ton
oz	troy ounce
oz/ton	troy ounce per short ton

SUMMARY

The Lime Creek study area lies about 100 air km east of Boise, 70 air km northeast of Mountain Home, and about 27 air km northwest of Fairfield, Idaho (fig. 1). The eastern boundary of the east-west-elongate study area lies 0.2 km west of 3,077-m-high Smoky Dome. The 28,000-hectare study area is mainly underlain by Cretaceous-age granitoid rocks of the Idaho batholith.

Two mines and a prospect were found in the study area. Near the southwest corner of the area, at the President and Last Chance mines, gold mineralization occurs along steeply dipping, east-northeast-trending faults and associated quartz veins, and, in some places, within adjacent Cretaceous granitic rock. Between 1904 and 1935, about 7.2 kilograms (kg) of gold and 10.3 kg of silver were mined from the President mine, and 2.8 kg of gold and 24.7 kg of silver were mined from the Last Chance. These properties have been claimed and reclaimed several times; the President is currently covered by a 16-claim group. The mineralized material is not rich enough to mine underground under current economic conditions, and near-surface, open-pit-mineable deposit areas were not identified. The Ventura, in the northwest part of the area, is within altered pink granite, but metal concentrations are low.

No evidence of geothermal activity was observed. Rock in the area does not split into flat slabs, which could be useful as dimension stone, would require crushing to be used as aggregate, and is not convenient to markets. Alluvial concentrate (placer) samples did not contain free gold, and no substantial alluvial deposits were seen.

INTRODUCTION

This report is part of the USBM (U.S. Bureau of Mines) Idaho Land Assessment Program to study the mineral resources of priority roadless areas in Idaho. The results of mineral inventories on specific study areas, such as Lime Creek, provide minerals information needed by the President, the Congress, land management agencies, and ultimately, by the Public, to make wise decisions regarding future land management practices. The information also helps fulfill a long-term Bureau of Mines objective, to ensure the nation has an adequate and dependable supply of minerals at a reasonable cost.

Geographic Setting

The Lime Creek study area, encompassing about 28,000 hectares of the Sawtooth National Forest, is in southern Idaho's Elmore and Camas Counties about 100 air km east of Boise, 70 air km northeast of Mountain Home, and 27 air km northwest of Fairfield (fig. 1). Principal road access is by U.S. Highway 20 from Mountain Home. Forest Service and county roads surround the study area region; branching four-wheel-drive Forest Service and BLM (Bureau of Land Management) roads lead to the study area; pack trails and a few four-wheel-drive roads access the interior. Nearby small towns include Pine and Featherville (west of the study area), Hill City and Corral (to the south), Fairfield (southeast), and Atlanta (north).

The study area is part of the northwest-trending Soldier Mountains, one of the southernmost ranges bordering the Snake River Plain. Elevations range from a 3,013-m ridge, 0.5 km southwest of Smoky Dome, at the east end of the study area, and 2,955-m Iron Mountain, at the north end, to about 1,527 m along Lime Creek, where it exits the study area along the western boundary. Smoky Dome, at 3,077 m, is the highest peak in the Soldier Mountains.

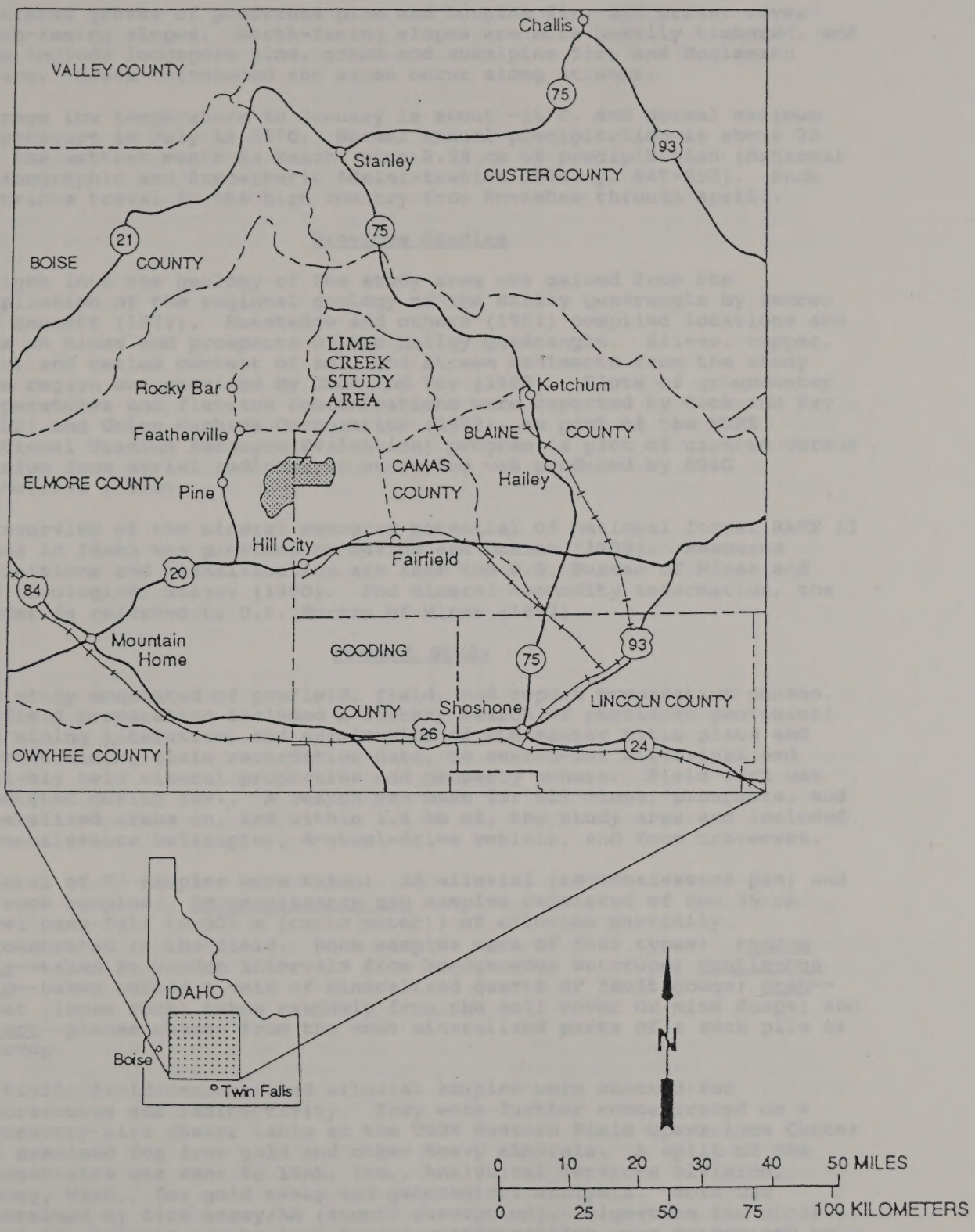

Figure 1.- Location of the Lime Creek study area, Camas and Elmore Counties, Idaho

Scattered groves of ponderosa pine and Douglas fir, and grass, cover south-facing slopes. North-facing slopes are more heavily timbered, and also include lodgepole pine, grand and subalpine fir, and Englemann spruce. Black cottonwood and aspen occur along streams.

Average low temperature in January is about -16°C, and normal maximum temperature in July is 29°C. Normal annual precipitation is about 23 cm; the wettest month is March, with 2.54 cm of precipitation (National Oceanographic and Atmospheric Administration 1974, p. 647-653). Snow restricts travel in the high country from November through April.

Previous Studies

Insight into the geology of the study area was gained from the compilation of the regional geology of the Hailey Quadrangle by Rember and Bennett (1979). Huestedde and others (1981) compiled locations and data on mines and prospects of the Hailey Quadrangle. Silver, copper, zinc, and cerium content of soil and stream sediments from the study area region was provided by Cook and Fay (1982). Plots of groundwater temperatures and fluorine concentrations were reported by Cook and Fay (1982) and Union Carbide Corporation (1982), as part of the NURE (National Uranium Resource Evaluation) program; a plot of uranium versus thorium from aerial radiometric surveying was produced by EG&G geoMetrics (1980).

An overview of the mineral resource potential of national forest RARE II areas in Idaho was provided by Nevins and Oakman (1988). Resource definitions and classification are from the U.S. Bureau of Mines and U.S. Geological Survey (1980). For mineral commodity information, the reader is referred to U.S. Bureau of Mines (1993).

Present Study

The study consisted of prefield, field, and report preparation phases. Prefield preparation included a library search of pertinent geological and mining literature, and examination of BLM master title plats and current mining claim recordation data, to search-out historical and actively held mineral properties and property owners. Field work was conducted during 1991. A search was made for all mines, prospects, and mineralized areas in, and within 1.6 km of, the study area and included reconnaissance helicopter, 4-wheel-drive vehicle, and foot traverses.

A total of 73 samples were taken: 33 alluvial (reconnaissance pan) and 40 rock samples. Reconnaissance pan samples consisted of two 36-cm level pans-full [0.006 m^3 (cubic meter)] of alluvium partially concentrated in the field. Rock samples were of four types: random chip--taken at random intervals from homogeneous outcrops; continuous chip--taken across a vein of mineralized quartz or fault gouge; grab--float (loose rock) taken randomly from the soil cover or mine dumps; and select--pieces chosen from the most mineralized parts of a rock pile or outcrop.

Partially field-concentrated alluvial samples were checked for fluorescence and radioactivity. They were further concentrated on a laboratory-size shaker table at the USBM Western Field Operations Center and examined for free gold and other heavy minerals. A split of the concentrates was sent to IGAL, Inc., Analytical Services Division, Cheney, Wash., for gold assay and geochemical analysis. Gold was determined by fire assay/AA (atomic absorption). Digestion for minor elements analysis was by Aqua Regia; concentrations were determined by AA, except As (arsenic) and Sb (antimony) were determined by organic extraction and W (tungsten), Ba (barium), and Mo (molybdenum) were by ICP (inductively coupled plasma-emission spectroscopy). Sample splits prepared for whole rock analysis were fused with lithium tetra and meta

borate at 1000°C. Analysis was for major rock-forming elements by AA, except Ca (calcium), Mg (magnesium), and Ti (titanium) were by ICP; concentrations were converted to percent of equivalent oxide.

ACKNOWLEDGEMENTS

The author would like to thank Bill Pinkerton, Mountain Home, owner of the President mine, and Jerry "Moe" L. Inama, of Atlanta and Cascade, for helpful historical and technical information on study area prospects. Buz Vanskike, Fairfield Ranger Station, and Hobb Essick, Mountain Home Ranger Station, provided information on prospects and helpful logistical advise. Elizabeth Hill, USBM, ably assisted in the field.

MINING HISTORY

Regional History

Mining in the region around the Lime Creek area dates back to 1863, when gold-bearing quartz lodes were discovered at Rocky Bar, northwest of the study area (fig. 2, no. 1). By the 1870's lode and placer mining were actively pursued, and by 1881, the Rocky Bar area produced about $2.8 million in lode gold (at a $20.47 per troy ounce gold price) and $2 million in placer gold from the Feather River drainage basin (Ballard, 1928, p. 2-5).

The Pine Grove district, west of the study area, was formed after the Franklin mine (fig. 2, no. 4) was discovered about 1894 (Moore, 1910, p. 57). The district also included the Bonnie Anna mine (fig. 2, no. 5) and several smaller mines and prospects, including the Jingo/Hornet (no. 6), the President (no. 7), and the Last Chance (no. 8) mines.

Other prospects in the vicinity include two tungsten properties south and southeast of the study area, respectively; the Corral Creek (fig. 2, no. 9) and Harrison (no. 12); the former property dates back to about 1912 (Livingston, 1919, p. 25). East of the study area, the Perseverance mine (no. 3), an unnamed prospect (no. 10), and the Richard Allen mine (no. 11), appear to be lead-silver properties, with accessory gold and zinc values. Many additional mines and mining districts occur north and northeast of the study area across the South Fork of the Boise River and Little Smoky Creek.

Several warm and hot springs are along the South Fork of the Boise River, and one is along Corral Creek, southeast of the study area (fig. 2). These, and additional geothermal springs to the north and northeast, are documented in more detail in Ross (1971, p. 13, 14, and 40), and in Waring (1965, p. 14 and 25).

Study Area History

The Lime Creek study area contains a paucity of prospects compared to the surrounding region. Even in the relatively mineralized southwest part of the study area, where claim blocks have blanketed many hectares from time to time, there are only a few workings.

The only working found in the northern and eastern part of the study area is on the Ventura prospect, a block of eight claims located during the middle 1970's by A. L. Mari, of Port Arthur, Texas. A Forest Service mineral examination determined the claims to be invalid in 1976. The President mine (fig. 2, no. 7) and the Last Chance mine (no. 8), the two main properties in the southwest part of the study area, were developed, along with the Jingo/Hornett (no. 6), between 1897 and 1914. The properties were developed by the same interests, a consortium called the Lime Creek Gold Mining Company of Mountain Home; owners included

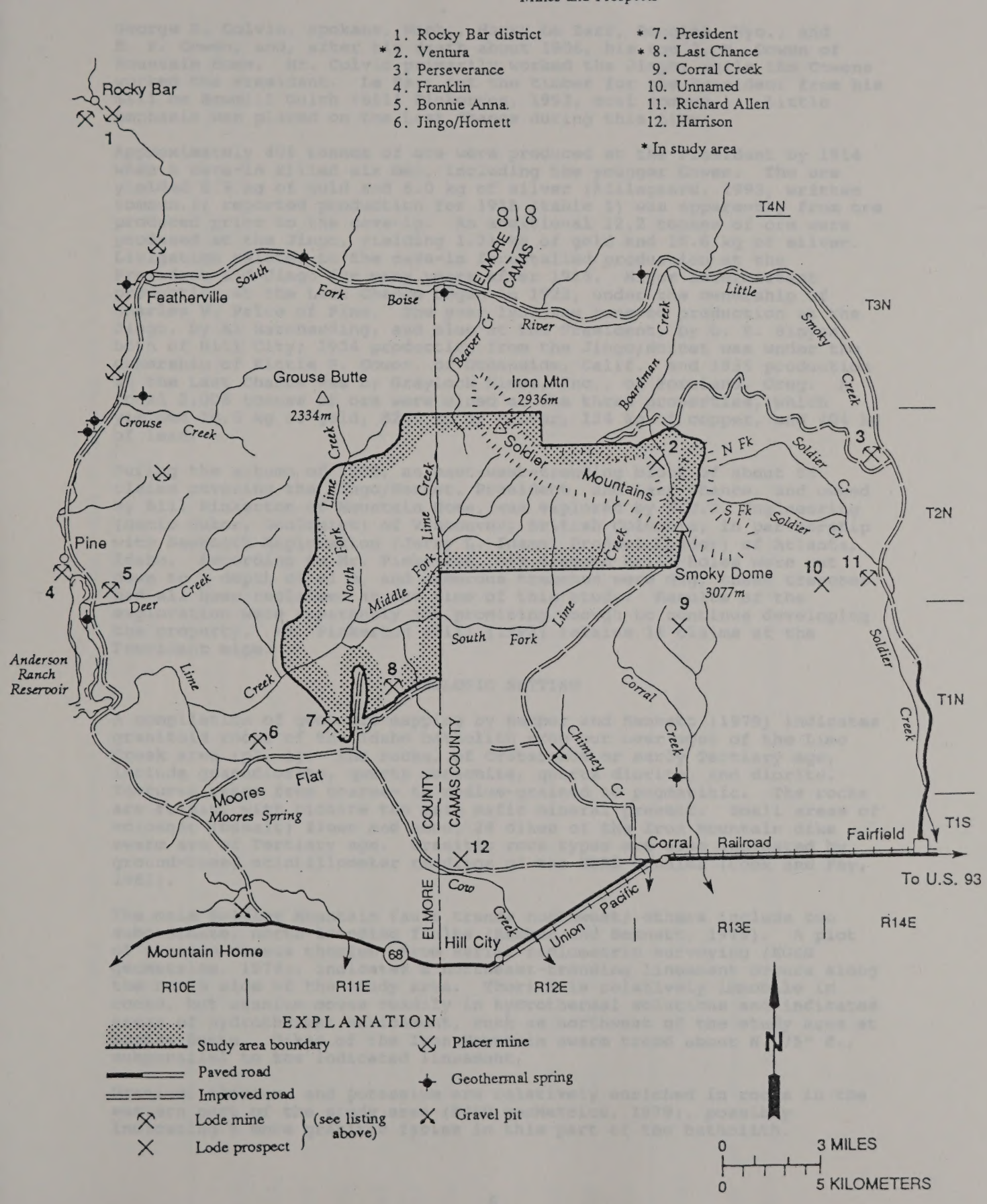

Figure 2.- Mines and prospects in the Lime Creek area and vicinity

George R. Colvin, Spokane, Wash., Harry Le Barr, Douglas, Wyo., and E. P. Cowen, and, after his death about 1906, his son J. M. Cowen of Mountain Home. Mr. Colvin primarily worked the Jingo, while the Cowens worked the President. Le Barr cut the timber for the President from his mill on Sawmill Gulch (Bill Pinkerton, 1993, oral commun.). Little emphasis was placed on the Last Chance during this time.

Approximately 406 tonnes of ore were produced at the President by 1914 when a cave-in killed six men, including the younger Cowen. The ore yielded 6.5 kg of gold and 5.0 kg of silver (Kiilsgaard, 1993, written commun.); reported production for 1915 (table 1) was apparently from ore produced prior to the cave-in. An additional 12.2 tonnes of ore were produced at the Jingo, yielding 1.21 kg of gold and 10.6 kg of silver. Litigation related to the cave-in forestalled production at the President and Jingo for many years after 1915. Minor intermittent production at the Last Chance began in 1923, under the ownership of Charles V. Price of Pine. The year 1933 saw renewed production at the Jingo, by Al Barcherding, and also at the President, by O. E. Binyon, both of Hill City; 1934 production from the Jingo/Hornet was under the ownership of Kittie S. Cowen, of Oceanside, Calif., and 1935 production at the Last Chance was by Graylock Mines, Inc., of Portland, Oreg. A total 2,006 tonnes of ore were mined at the three properties, which yielded 18.0 kg of gold, 82.8 kg of silver, 134 kg of copper, and 404 kg of lead.

During the autumn of 1988, an east-west-trending block of about 55 claims covering the Jingo/Hornet, President, and Last Chance, and owned by Bill Pinkerton of Mountain Home, was explored by N.V.C. Engineering (Damir Cukor, Geologist) of Vancouver, British Columbia, in partnership with Sawtooth Exploration (Jerry L. Inama, Project Leader) of Atlanta, Idaho. According to Mr. Pinkerton, six diamond drill holes were put down to a depth of 61 m, and numerous trenches were dug; these trenches had all been reclaimed at the time of this study. Results of the exploration were apparently not promising enough to continue developing the property. Mr. Pinkerton still (1993) retains 16 claims at the President mine.

GEOLOGIC SETTING

A compilation of geologic mapping by Rember and Bennett (1979) indicates granitoid rocks of the Idaho batholith crop out over most of the Lime Creek area (pl. 1). The rocks, of Cretaceous or early Tertiary age, include granodiorite, quartz monzonite, quartz diorite, and diorite. Textures range from coarse- to medium-grained to pegmatitic. The rocks are felsic, with biotite the main mafic mineral present. Small areas of volcanic (basalt) flows and about 28 dikes of the Iron Mountain dike swarm are of Tertiary age. Granitic rock types are also indicated by ground-based scintillometer readings of the NURE studies (Cook and Fay, 1982).

The main Soldier Mountain fault trends northwest; others include two subordinate, north-trending faults (Rember and Bennett, 1979). A plot of uranium versus thorium, from aerial radiometric surveying (EG&G geoMetrics, 1979), indicates a northeast-trending lineament occurs along the north side of the study area. Thorium is relatively immobile in rocks, but uranium moves readily in hydrothermal solutions and indicates areas of hydrothermal enrichment, such as northwest of the study area at Grouse Butte. Dikes of the Iron Mountain swarm trend about N. 75° E., subparallel to the indicated lineament.

Uranium, thorium, and potassium are relatively enriched in rocks in the eastern part of the study area (EG&G geoMetrics, 1979), possibly indicating a more granitic facies in this part of the batholith.

TABLE 1.--Metal production* from the Lime Creek study area and vicinity, Camas and Elmore Counties, Idaho

[Au - gold, Ag - silver, Cu - copper, Pb - lead; oz - troy ounce (31.103 grams), lb - pounds (453.59 grams), tons (0.9078 metric tonnes)

	Jingo/Hornet					President					Last Chance				
Year	Ore Mined tons	Au (oz)	Ag (oz)	Cu (lb)	Pb (lb)	Ore Mined tons	Au (oz)	Ag (oz)	Cu (lb)	Pb (lb)	Ore Mined tons	Au (oz)	Ag (oz)	Cu (lb)	Pb (lb)
1904						420	190	85	--	--					
1907	14	37	340	--	--										
1908						5	5	3	--	--					
1915						23	12.6	73	--	--					
1923											4	2.04	1	--	--
1926											15	15	7	--	--
1927											10	12.37	5	--	--
1932											1	1.09	5	--	--
1933	153	189.65	997	59	543	22	24.36	169	129	160					
1934	44	30.71	200	107	--										
1935											1,500	59.88	777	--	--
Total	211	257.36	1,537	166	543	470	231.96	330	129	160	1,530	90.38	795	--	--

* In total recoverable metals

Table modified from Thor Kiilsgaard, 1993 (U.S. Geological Survey, written commun.)

Silver, zinc, copper, and cerium in stream sediment and soil samples (Cook and Fay, 1982) reflect known mineralization in the southwest and northeast parts of the study area, as well as east of it, and may suggest mineralization in the Grouse Butte area. In the southwest part of the study area (the President and Last Chance mines), gold, silver, and minor base-metal mineralization occurs in quartz veins and gouge along N. 70° E.-striking faults and also within adjacent Cretaceous white quartz monzonite and granodiorite. In the northeast part of the area (the Ventura prospect), hydrothermal alteration appears to be in pink Tertiary granite.

Alluvium is sparse along most drainages, except for the lower reaches of the main forks of Lime Creek. There, alluvium occurs as discontinuous reaches, indicating a range from youth to early maturity in the geomorphic stream cycle. Alluvial deposits are too small to indicate the possibility of placer deposits.

MINES AND PROSPECTS

Ventura Prospect

At the Ventura prospect (fig. 2, no. 2), highly silicified and epidotized pink granite is exposed in a single, 50-m-long trench (fig. 3). The pink color of the granite suggests a possible Tertiary age; typical Cretaceous granitic rocks of the Idaho batholith tend to be white. Local pink granite stocks within the batholith are commonly associated with metallic deposits. The predominant structural grain, as indicated by two faults (fig. 3) is northeast-trending, a trend also associated with mineralization elsewhere in the batholith. Four samples were taken (table A-1, part II, nos. 7-10); all contained detectable gold, ranging from 10 to 15 ppb. Sample 10 also contained weak concentrations of silver (4.3 ppm), lead (225 ppm), and zinc (355 ppm). These element concentrations are not of direct economic significance, but do indicate 1) that mineralizing processes have occurred and 2) that higher element concentrations may occur in the vicinity. No metallic resources were identified at the prospect.

President Mine

Mineralization at the President mine (fig. 2, no. 7) occurs within, and adjacent to, north 65°- to 70°-east-striking quartz vein- and fault gouge-filled structures (pl. 2), which dip steeply to the southeast. The 30- to 46-cm-wide structures cut white- to cream-colored quartz monzonite of probable Cretaceous age. Evidence was found for only one mineralized zone, consisting of discontinuous vein and gouge structures, which were segmented by cross faulting or possibly formed in en echelon tension fractures. Workings appear to include four caved adits, probably totalling several hundred feet in length, one open shaft of unknown depth, and several pits and trenches; one pit appears to be the start of a shaft. Eighteen rock samples (table A-1, nos. 53- 71) were taken. Gold was detected in all samples and exceeded 90 ppb in 15 samples. Other metal concentrations in most samples included silver, copper, lead, zinc, and mercury, implying these metals are good indicator elements for the mineralized system; arsenic and antimony concentrations were not elevated, unlike most epithermal systems. Both select and grab samples were taken from each of the two main mine dumps (nos. 60-63); in both cases the grab samples contained more gold than the select, highly mineralized-looking samples.

Gold content in the samples reached a maximum value of $37 per tonne at a $11.25 per gram ($350 per troy ounce) gold price (sample 53). Gold values in the granitic rocks adjacent to the vein and fault structures commonly equaled values within structures. At $37 per tonne, gold values are insufficient to support underground mining by a factor of at

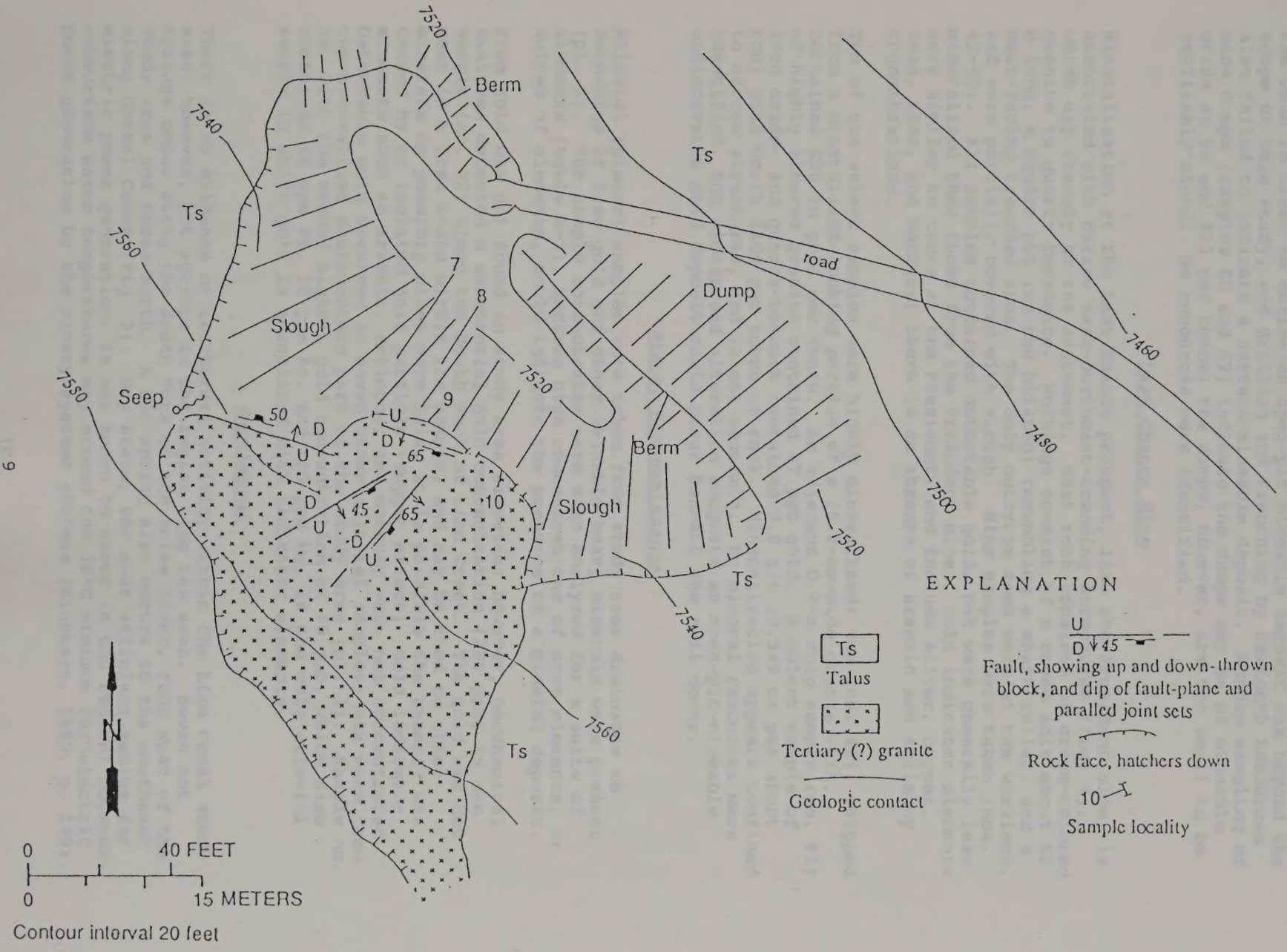

Figure 3.- Geology and sample localities at the Ventura prospect

least three, especially given the narrowness of the veins. Drilling by the USBM in order to define an open-pit mineable deposit was beyond the scope of this study, and drilling and trenching by Sawtooth Resources also failed to indicate a surface-mineable deposit. Random sampling of mine dumps (samples 60 and 62) indicate the dumps may be of mineable grade at $8 and $21 per tonne; the dumps, however, are too small to be profitably mined. No resources were identified.

Last Chance Mine

Mineralization at the Last Chance prospect, like the President mine, is associated with narrow east-northeast-trending structures (fig. 4), which dip steeply to the southeast. Host rock consists of cream-colored granite to quartz monzonite. Workings consist of a caved adit about 60 m long, a square pit (on the hilltop) resembling a shaft-collar, and a west-facing trenched area. The only outcrops seen were at the workings, and were partially covered with slough. Nine samples were taken (nos. 42-50). All samples contained detectable gold, but were generally less mineralized than those from the President mine. Gold indicator elements were similar to those at the President, and include silver, copper, lead, zinc, and mercury; there is an absence of arsenic and antimony concentrations.

Two of the select samples were highly mineralized; one (no. 42), chipped from a mineralized-looking portion of a 15.2-cm-wide quartz vein, contained $26 in gold per tonne. An adjacent 0.9-m chip sample (no. 93) of highly altered granite contained 47 ppb gold. A select sample of iron oxide- and quartz-boxwork contained 9.6 g/t (0.339 oz per short ton) gold worth $108 per tonne of rock. Mineralization appears confined to narrow structures, and is not economic. No mineral resources were identified, but widespread alteration suggests an open-pit-mineable undiscovered gold deposit could occur beneath the soil cover.

Placer Reconnaissance

Alluvial (placer) samples were taken from study area drainages to determine if free gold and other valuable heavy minerals were present (pl. 1). The sample concentrates were also analyzed for a suite of elements (table A-1), because high concentrations of some elements, or suites of elements, could indicate the presence of a mineral deposit.

Free gold was not found in study area alluvium; however, geochemical analyses detected a substantial gold concentration (285 ppb) in one sample (no. 32) along the South Fork of Lime Creek. The gold was not seen in a free state within the sample, and may be tied to other minerals or possibly plant materials; it is possible the anomaly was caused by an isolated gold particle (nugget effect) Gold indicator elements such as arsenic, antimony, and mercury were not concentrated. Detectable gold occurred in seven other alluvial samples; six were from the mineralized southwestern part of the study area (pl. 1). Sample no. 36, with the second highest gold concentration of 68 ppb, which also contained 68 ppm Pb, 12 ppm As, and 110 ppb Hg, is the only alluvial sample in which gold is associated with indicator elements.

Geothermal

There is no evidence of geothermal activity within the Lime Creek study area; however, hot springs in the region ring the area. Seven hot springs occur along the South Fork of the Boise River, four west of the study area and three north. A hot spring also occurs to the southeast along Corral Creek (fig. 2). Dry steam, the most efficient medium for electric power generation, is not known to occur in the region; however, subsurface water temperatures may exceed the 38°C minimum for electric power generation by the binary systems process (Rinehart, 1980, p. 199).

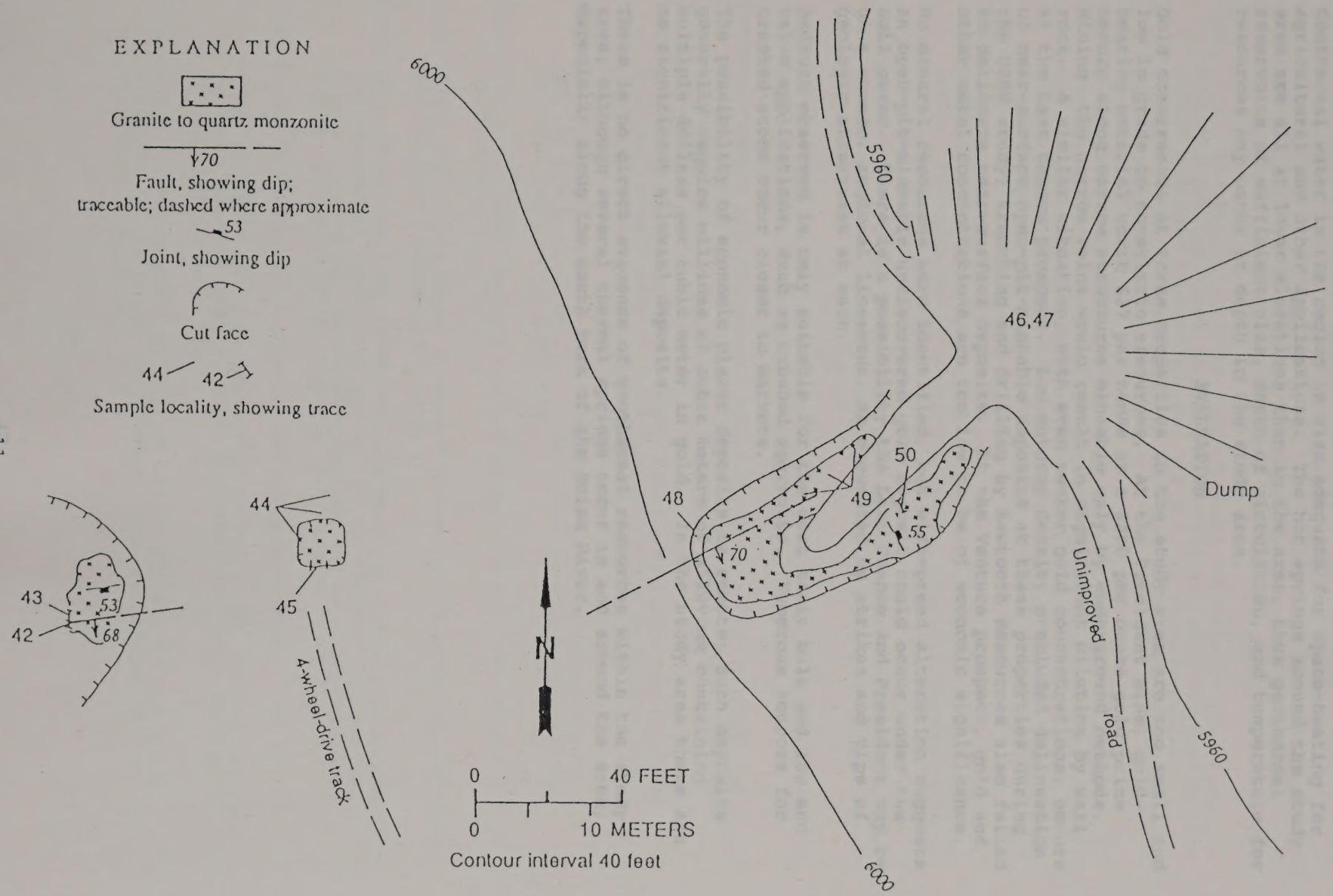

Figure 4.- Geology and sample localities at the Last Chance mine

Geothermal water in the region is also adequate for space-heating for agricultural and other applications. The hot springs around the study area are all at lower elevations than in the area, thus geothermal reservoirs of sufficient size, depth of circulation, and temperature for resources may occur at depth in the study area.

EVALUATION

Gold occurrences at three properties in the study area are too small and low in grade to constitute resources. At the President mine, gold-bearing material worth $37 per tonne at a $350 per ounce gold price occurs along narrow structures mineable only by underground methods. Mining the narrow veins would result in significant dilution by wall rock. A similar situation, with even weaker gold concentrations, occurs at the Last Chance prospect. Low outcrop density precluded delineation of near-surface open-pit-mineable deposits at these properties during the USBM study; trenching and drilling by Sawtooth Resources also failed to delineate near-surface deposits. At the Ventura prospect, gold and other metal concentrations are too low to be of economic significance.

No mineral resources were identified, but widespread alteration suggests an open-pit-mineable undiscovered gold deposit could occur under the soil cover. There is a possibility the Last Chance and President may be on a common, regional lineament, as suggested by strikes and dips of geologic structures at each.

Bedrock observed is only suitable for the most basic bulk and low end value applications, such as crushed aggregate. Numerous sources for crushed stone occur closer to markets.

The possibility of economic placer deposits is remote; Such deposits generally require millions of cubic meters of alluvium containing multiple dollars per cubic meter in gold. In the study area there are no significant alluvial deposits.

There is no direct evidence of geothermal resources within the study area, although several thermal springs occur in and around the area, especially along the South Fork of the Boise River.

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TABLE A-1. -- Trace-element analyses of samples from the Lime Creek study area, Camas and Elmore Counties, Idaho

[Bld - boulders, cbl - cobbles, pbl - pebbles, sd - sand, slt - silt, cly - clay, org - organics, pk - pink, wt - white, grn - granite, sch - schist, blt - basalt, rhy - rhyolite, qtz - quartz, float - unattached rock pieces, < - less than, > - greater than, Fe stns - iron stains, Do... - ditto, reconnaissance, ppb - parts per billion, NA - not analyzed, cm - centimeter, m^3 - cubic meter, m - meter, mm - millimeter, g - gram]

Sample no.	Description	Free gold in g/m^3; value in $0.00/$m^3$	In parts per million, except as noted														
			Au (ppb)	Ag	Cu	Pb	Zn	As	Sb	W	Mn	Ba	Mo	Hg (ppb)	La	Ce	Y
Part I, Alluvial Concentrate Samples:																	
1	Bedload 10% cbl, 90% matrix (sampled). Sample 30% pbl > 2.5-cm-, and 25% 1.3-0.65-cm-diameter (pea-size); 45% < pea-size (15% pbl and granules, 27% sd and slt, 3% black sd); 70% wt grn, 15% gneiss, 5% quartzite, 5% blt, and 5% qtz.	--	<5	<0.2	10	<2	33	<5	<5	<10	392	<100	2	<10	NA	NA	NA
2	Bedload 20% bld, 30% cbl, 50% matrix (sampled). Sample 5% cbl, 40% pbl > 0.65-cm-diameter (pea-size); 55% < pea-size (20% pbl and granules, 25% sd, 10% slt, trace black sd); 90% pk grn, 5% wt grn, 5% blt.	--	<5	<0.2	6	6	23	<5	<5	<10	78	<100	<1	<10	NA	NA	NA
3	Bedload 10% bld, 10% cbl, 80% matrix (sampled). Sample 5% cbl, 40% pbl > 0.65-cm-diameter (pea-size); 55% < pea-size (20% pbl and granules, 25% sd, 10% slt, trace black sd); 90% pk grn, 5% wt grn, 5% blt.	--	<5	<0.2	8	13	35	<5	<5	<10	205	<100	2	<10	NA	NA	NA
4	Bedload 20% bld, 30% cbl, 50% matrix (sampled). Sample 5% cbl, 40% pbl > 0.25-cm-diameter (pea-size); 55% < pea-size (20% pbl and granules, 25% sd, 10% slt, trace black sd); 90% pk grn, 5% wt grn, 5% blt.	--	<5	<0.2	16	17	46	<5	<5	<10	280	<100	2	25	NA	NA	NA
5	Bedload 20% bld, 35% cbl, 45% matrix (sampled). Sample 25% cbl, 25% pbl > 0.65-cm-diameter (pea-size); 50% < pea-size (30% pbl and granules, 20% sd and slt, trace black sd); 95% pk grn, 5% blt and other.	--	<5	<0.2	7	10	27	<5	<5	<10	35	<100	<1	<10	NA	NA	NA
6	Bedload 25% bld, 30% cbl, 45% matrix (sampled). Sample 20% pbl > 2.5-cm-, and 30% 1.3-0.65-cm-diameter (pea-size); 50% < pea-size (30% pbl and granules, 20% sd and slt, trace black sd); 95% pk grn, 5% blt.	--	<5	<0.2	9	22	46	<5	<5	<10	160	<100	<1	<10	NA	NA	NA
12	Bedload 15% bld, 50% cbl, 35% matrix (sampled). Sample 5% cbl, 15% pbl > 2.5-cm-, and 30% 1.3-0.65-cm-diameter (pea-size); 50% < pea-size (15% granules, 35% sd and slt); 40% rhy, 30% pk grn, 10% wt grn, 10% dacite, 5% blt, 5% limestone.	--	<5	<0.1	12	8	44	<5	<5	<10	340	<100	2	15	NA	NA	NA
15	Similar to sample 12.	--	<5	<0.2	13	7	39	<5	<5	<10	295	<100	1	10	NA	NA	NA

TABLE A-1. -- Trace element analyses of samples from the Lime Creek study area, Camas and Elmore Counties, Idaho -- continued

Sample no.	Description	Free gold in g/m^3; value in $0.00/$m^3$	In parts per million, except as noted														
			Au (ppb)	Ag	Cu	Pb	Zn	As	Sb	W	Mn	Ba	Mo	Hg (ppb)	La	Ce	Y
Part I, Alluvial Concentrate Samples -- continued:																	
18	Bedload 5% bld, 10% cbl, 85% matrix (sampled). Sample 15% pbl > 2.5-cm-, and 20% 1.3-0.65-cm-diameter (pea-size); 65% < pea-size (40% granules, 24% sd and slt, 1% black sd); 70% grn, 15% blt, 15% rhy.	--	<5	<0.2	8	4	28	<5	<5	<10	187	<100	1	20	NA	NA	NA
17	Sample 15% pbl > 2.5-cm-, and 15% 1.3-0.65-cm-diameter (pea-size); 70% < pea-size (15% granules, 50% sd and slt, 1% black sd); 50% pk grn, 45% rhy. 5% mafic dike.	--	<5	<0.2	10	7	26	<5	<5	<10	260	<100	1	<10	NA	NA	NA
19	Sample 10% pbl > 2.5-cm-, and 30% 1.3-0.65-cm-diameter (pea-size); 60% < pea-size (15% granules, and small pbl, 45% sd and slt); 60% pk grn, 20% wt grn, 10% blt, 5% qtz, and 4% dacite.	--	<5	<0.2	12	25	44	18	<5	<10	395	<100	2	<10	NA	NA	NA
20	Bedload 5% bld, 40% cbl, 55% matrix (sampled). Sample 5% pbl > 2.5-cm-, and 20% 1.3-0.65-cm-diameter (pea-size); 75% < pea-size (25% small pbl and granules, 50% sd and slt, trace black sd); 95% grn, 5% blt.	--	<5	<0.2	8	13	40	<5	<5	<10	63	<100	<1	<10	NA	NA	NA
21	Bedload 20% bld, 20% cbl, 60% matrix (sampled). Sample 5% pbl > 2.5-cm-, and 20% 1.3-0.65-cm-diameter (pea-size); 75% < pea-size (25% small pbl and granules, 50% sd and slt, trace black sd); 95% grn, 5% blt.	--	45	<0.2	9	6	33	<5	<5	<10	390	<100	1	10	NA	NA	NA
24	Bedload 15% bld, 20% cbl, 65% matrix (sampled). Sample 45% pbl > 0.65-cm-diameter (pea-size); 55% < pea-size (15% small pbl and granules, 25% sd and 15% slt); 75% wt grn (20% peg), 10 % mafic dike, 10% qtz and 5% biotite hornblende gneiss.	--	<5	<0.2	10	12	45	<5	<5	<10	350	<100	1	10	NA	NA	NA
25	Bedload 30% bld, 20% cbl, 50% matrix (sampled). Sample 10% cbl and 20% pbl > 0.65-cm-diameter (pea-size); 70 % < pea-size (25% small pbl and granules, 45% sd and slt); 90% grn (15% peg), 5% blt and 10% qtz.	--	<5	<0.2	5	7	25	<5	<5	<10	302	<100	1	<10	NA	NA	NA
26	Bedload 30% bld, 20% cbl, 50% matrix (sampled). Sample 5% cbl, 25% pbl > 0.65-cm-diameter (pea-size); 55% < pea-size (40% small pbl and granules, 30% sd, trace black sd); 80% grn, 10 % blt, 5% qtz and 5% rhy.	--	<5	<0.2	6	3	26	<5	<5	<10	163	<100	1	<10	NA	NA	NA

TABLE A-1. -- Trace element analyses of samples from the Lime Creek study area, Camas and Elmore Counties, Idaho -- continued

Sample no.	Description	Free gold in g/m^3; value in $\$0.00/m^3$	In parts per million, except as noted														
			Au (ppb)	Ag	Cu	Pb	Zn	As	Sb	W	Mn	Ba	Mo	Hg (ppb)	La	Ce	Y
Part I, Alluvial Concentrate Samples -- continued:																	
27	Bedload 30% bld, 20% cbl, 50% matrix (sampled). Sample trace cbl, 20% pbl > 2.5-cm-, and 20% 1.3-0.65-cm-diameter, 60% < pea-size (25% small pbl and granules, 30 % sd and slt, and 5% cly); 70% wt, and 20% pk grn, and 10% mafic rocks.	--	10	<0.2	9	12	38	<5	<5	<10	272	<100	2	10	NA	NA	NA
28	Bedload 25% cbl, 75% matrix (sampled) (sampled). Sample 30% pbl > 2.5-cm-, and 10% 1.3-0.65-cm-diameter, 60% < pea-size (15% small pbl and granules, 35 % sd and slt, and 10% cly); 60% wt grn and 40% mafic rocks.	--	<5	<0.1	9	13	39	<5	<5	<10	325	<100	1	25	NA	NA	NA
31	Bedload 1% bld, 19% cbl, 80% matrix (sampled). Sample 30% pbl > 2.5-cm-, and 10% 1.3-0.65-cm-diameter, 60% < pea-size [10% small pbl and granules, 40 % sd and slt (2% black sd) and 10% cly]; 70% pk grn, 15% blt, and 15% felsic dike rocks.	--	<5	<0.2	12	8	47	<5	<5	<10	303	<100	1	30	NA	NA	NA
32	Bedload 20% cbl, 80% matrix (sampled) Sample 25% pbl > 2.5-cm-, and 10% 1.3-0.65-cm-diameter, 65% < pea-size [20% small pbl and granules, 45 % sd and slt (1% black sd)]; 85% pk grn, 10% blt and 5% rhy.	--	285	<0.2	10	12	38	<5	<5	<10	345	<100	2	25	NA	NA	NA
33	Sample 5% cbl, 15% pbl > 2.5-cm-, and 15% 1.3-0.65-cm-diameter (pea-size; 65% < pea-size (15% granules and small pbl, 50% sd and slt, and trace black sd); 85% grn and 15% mafic rocks.	--	<5	0.1	19	11	42	<5	<5	<10	360	<100	3	10	NA	NA	NA
34	Sample 15% pbl > 2.5-cm-, and 20% 1.3 0.65-cm-diameter (pea-size); 65% < pea-size (20% small pbl and granules, 20% sd, 20% slt and 5% cly; trace black sd); 30% pk grn, 15% wt grn, 30% rhy, 20% blt and 5% qtz.	--	<5	<0.2	22	24	52	<5	<5	<10	335	<100	2	<10	NA	NA	NA
35	Bedload 50% bld, 30% cbl, 20% matrix (sampled). Sample 50% pbl > 0.65-cm-diameter (pea-size); 50% < pea-size (10% small pbl and granules, 40% sd); 90% wt grn, 10% blt, and trace qtz.	--	15	<0.2	7	24	48	<5	<5	<10	480	<100	2	40	NA	NA	NA
36	Bedload 30% bld, 50% cbl, 20% matrix (sampled). Sample 35% pbl > 0.65-cm-diameter (pea-size); 65% < pea-size (40% small pbl and granules, 20% sd, 3% silt, 2% black sd); 45% wt grn, 15% pk grn, 30% limestone, 10% dacite with trace qtz.	--	68	<0.2	11	68	40	12	<5	<10	295	<100	2	110	NA	NA	NA

TABLE A-1. -- Trace element analyses of samples from the Lime Creek study area, Camas and Elmore Counties, Idaho -- continued

Sample no.	Description	Free gold in g/m^3; value in $0.00/$m^3$	In parts per million, except as noted													
			Au (ppb)	Ag	Cu	Pb	Zn	As	Sb	W	Mn	Ba	Mo	Hg (ppb)	La	Ce	Y
Part I, Alluvial Concentrate Samples -- continued:																	
37	Bedload 30% cbl, 70% matrix (sampled) Sample 35% pbl > 0.65-cm-diameter (pea-size); 65% < pea-size (25% pbl and granules, 40% sd and slt); 75% grn (5% peg), 15% chloritic biotite hornblende gneiss, 10% pegmatitic andesite tuff.	--	<5	<0.2	10	10	29	<5	<5	<10	380	<100	2	95	NA	NA	NA
38	Bedload 5% bld, 45% cbl, 50% matrix (sampled). Sample 15% pbl > 0.65-cm-diameter (pea-size); 75% < pea-size (10% pbl and granules, 70% sd and slt); 85% grn, 10% qtz and 5% mafic dike.	--	<5	<0.2	9	11	34	<5	<5	<10	305	<100	2	<10	NA	NA	NA
39	Bedload 15% bld, 25% cbl, 60% matrix (sampled). Sample 30% pbl > 0.65-cm-diameter (pea-size), 10% 1.3-0.65-cm-diameter (pea-size); 70% < pea-size (20% small pbl and granules, 50% sd and slt); 60% grn (10% peg), 15% granodiorite, 10% rhy, 10% mafic dike and 5% qtz.	--	30	<0.2	19	90	103	<5	<5	<10	465	<100	2	30	NA	NA	NA
41	Bedload 10% cbl, 90% matrix (sampled) Sample 30% pbl > 0.65-cm-diameter, 20% 1.3-0.65-cm-diameter (pea-size); 50% < pea-size (20% small pbl and granules, 24% sd and slt, 5% cly, 1% black sd); 50% grn, 40% mafic dike and 10% quartzite.	--	40	<0.2	8	52	94	<5	<5	<10	750	110	1	25	NA	NA	NA
51	Sample 5% pbl > 2.5-cm-, and 15% 1.3-0.65-cm-diameter (pea-size); 80% < pea-size (20% small pbl and granules, 50% sd, 15% slt, 15% cly, 1% black sd); 50% grn and 50% mafic rock.	--	<5	<0.2	5	4	23	<5	<5	<10	325	<100	1	<10	NA	NA	NA
52	Bedload 5% bld and cbl, 95% matrix (sampled). Sample 10% pbl > 2.5-cm-, and 20% 1.3-0.25-cm-diameter (pea-size); 70% < pea-size (20% small pbl and granules, 47% sd and and slt, 3% black sd); 75% grn (and peg); 10% granodiorite, 10% mafic dike and 5% quartzite.	--	<5	<0.2	11	3	36	<5	<5	<10	440	<100	2	<10	NA	NA	NA
72	Sample 25% pbl > 2.5-cm-, and 15% 1.3-0.65-cm-diameter (pea-size); 60% < pea-size (20% small pbl and granules, 20% sd, 15% slt, 5% cly); 50% pk grn, 10% wt grn, 20% mafic rock, 10% gneiss, 5% rhy, 5% qtz.	--	15	<0.2	6	7	52	<5	<5	<10	375	<100	2	30	NA	NA	NA

TABLE A-1. -- Trace element analyses of samples from the Lime Creek study area, Camas and Elmore Counties, Idaho -- continued

Sample no.	Description	Free gold in g/m ; value in $0.00/m	In parts per million, except as noted														
			Au (ppb)	Ag	Cu	Pb	Zn	As	Sb	W	Mn	Ba	Mo	Hg (ppb)	La	Ce	Y
Part I, Alluvial Concentrate Samples -- continued:																	
73	Bedload 20% bld, 30% cbl, 50% matrix (sampled). Sample 20% pbl > 2.5-cm-, and 10% 1.3-0.65-cm-diameter (pea-size); 70% < pea-size (15% small pbl, 35% granules, 20% sd and slt); 60% grn and 40% mafic rock.	--	<5	<0.2	5	5	25	<5	<5	<10	430	<100	1	<10	NA	NA	NA
Part II, Rock Samples:		Sample type and length; gold value at $11.25/g															
7	Epidotized and strongly silicified pinkish gray medium-grained porphyritic hornblende granite; 1.3-cm-long potassium feldspar phenocrysts; local 0.65-cm-wide kaolinitic augen with Fe-stained cores.	Chip every 15 cm for 9.6 m	10	0.1	11	7	32	<5	<5	<10	230	<100	1	10	45	110	11
8	Similar to sample 7, but more intensively altered.	Chip 4.7 m	13	0.4	10	14	32	6	<5	<10	275	<100	2	15	36	87	11
9	Intensely epidotized and intensely silicified granite; float sample.	Select	12	0.2	10	21	47	<5	<5	<10	325	<100	2	15	40	103	10
10	Intensely Fe-stained, argillized and epidotized, silicified grn; locally qtz veined, fractured, and vuggy, but hard and unfriable throughout; float sample, some rock pieces have Fe oxide weathering rinds.	do...	15	4.3	41	225	355	21	<5	<10	205	<100	8	150	41	106	11
11	6.1-m-wide pk rhy dike trends east-west; qtz phenocrysts; predominant joint set trends N40°E, dips 83° NW, tension joints trend N45°W, dip 85°NE.	Random chip	35	0.8	32	41	32	<5	<5	<10	122	<100	<1	105	NA	NA	NA
13	Sheared and broken pk rhy dike; resilicified and epidotized; from fault zone exposed on the north side of Steward Creek.	Grab	13	0.3	31	34	38	<5	<5	<10	225	<100	1	35	<20	38	10
14	Partially epidotized diabase; slickensides common; cut by 1.3- to 2.5-cm-thick felsite dikes; from fault zone exposed on the north side of Steward Creek.	do...	10	0.1	28	4	73	<5	<5	<10	360	<100	1	20	48	116	15
18	Epidotized and intensely kaolinized greenish to pinkish wt rhy; qtz phenocrysts 2-3 mm across, 6-mm pk secondary feldspar phenocrysts; Fe stns coat fracture surfaces.	Random chip	8	0.1	2	24	11	8	<5	<10	48	<100	7	40	<20	16	15

TABLE A-1. -- Trace element analyses of samples from the Lime Creek study area, Camas and Elmore Counties, Idaho -- continued

Sample no.	Description	Sample type and length; gold value at $11.25/g	In parts per million, except as noted														
			Au (ppb)	Ag	Cu	Pb	Zn	As	Sb	W	Mn	Ba	Mo	Hg (ppb)	La	Ce	Y
Part II, Rock Samples -- continued:																	
22	Peach pk rhy dike with qtz phenocrysts to 2 mm in diameter; prominent jointing strikes N80°E, dips 85°NW, and appears to indicate the strike of the dike.	Random chip	<5	<0.1	11	10	10	<5	<5	<10	101	<100	1	15	<20	44	19
23	Medium- to fine-grained diabase dike; feldspar mainly pk forms lath-like crystals to 10 mm long; augite, interstitial to feldspar, makes up < 40% of rock, and forms sub-lath-like crystals to 3 mm long.	do...	10	0.1	18	2	82	<5	<5	<10	635	115	1	20	32	80	11
29	Buff pk, 9.1-m-wide rhy porphyry dike appears to strike N40°E and dip 90° parallel predominant joint set, second order joint set strikes N80°E, dips 45°NW; phenocrysts 20% 2 mm qtz, 15% 10 mm pk feldspar, and 10% 5 mm biotite grains.	Chip 2.7 m	<5	<0.1	2	12	14	<5	<5	<10	215	<100	<1	<10	NA	NA	NA
30	Pk porphyritic grn, probable dike; phenocrysts include pk feldspar (to 13 mm), biotite, and qtz; fault strikes N 76°W, dips 87°NE with 22° east-dipping right-lateral rake; joint sets strike N53°E, dip 66°E, and N6°E, dip 74°W, and are traced by 20-cm-wide Fe-stained qtz veinlets.	Random chip	<5	<0.1	11	13	52	<5	<5	<10	320	<100	<1	15	50	123	17
40	Potasium feldspar and quartz pegmatite.	Grab	17	<0.1	2	6	10	<5	<5	<10	85	<100	<1	25	<20	<10	22
42	Milky qtz and qtz microbreccia vein; occurs along fault striking N82°E, and dipping 68°SE; foot- and hanging wall are intensely altered grn; heavy Fe-stns along fractures.	Chip 15.2 cm $26/tonne	2780 [0.08 oz/ton]	6.7	24	165	76	5	<5	<10	43	<100	27	235	<20	15	<5
43	Strongly, potassically altered grn; light pk secondary feldspar; alternate qtz and grn bands; joint set strikes N81°E, dips 53° SE.	Chip 0.9 m	47	0.2	13	62	58	<5	<5	<10	85	<100	1	60	<20	22	5
44	Heavily Fe-stained qtz boxwork; from near pit on hilltop above adit.	Select $108/tonne	11620 [0.34 oz/ton]	58	44	360	172	12	<5	<10	20	110	32	2750	<20	<10	<5
45	Slightly crumbly, Fe-stained grn from pit on hilltop	Chip 0.9 m	125	0.4	11	18	69	5	<5	<10	62	<100	1	55	NA	NA	NA
46	Fe-stained qtz fragments from adit dump.	Select	160	2.4	7	25	56	<5	<5	<10	103	<100	1	165	NA	NA	NA
47	Grn fragments from adit dump.	Grab	22	0.1	10	30	97	<5	<5	<10	260	<100	<1	50	33	80	9
48	Wt kaolinized grn; local manganese and Fe-stns.	Chip 0.9 m	20	0.4	92	133	705	<5	<5	12	280	<100	1	40	30	76	8

TABLE A-1. -- Trace element analyses of samples from the Lime Creek study area, Camas and Elmore Counties, Idaho -- continued

Sample no.	Description	Sample type and length; gold value at $11.25/g	In parts per million, except as noted														
			Au (ppb)	Ag	Cu	Pb	Zn	As	Sb	W	Mn	Ba	Mo	Hg (ppb)	La	Ce	Y
Part II, Rock Samples -- continued:																	
49	Qtz float from pit; moderate Fe stns along fractures.	Select	55	0.9	18	14	8	<5	<5	<10	47	<100	1	60	<20	12	<5
50	Weathered and friable brownish-orange grn; slightly Fe stained, from wall of pit.	Chip 1.5 m	17	<0.1	7	10	102	<5	<5	<10	238	<100	<1	55	46	108	10
53	Medium- to coarse-grained, epidotized and silicified, reddish to dark brown Fe-stained qtz monzonite; jointing strikes N 52°E, dips 84°NW	Random chip $37/tonne	4030 [0.118 oz/ton]	2.4	72	290	433	<5	<5	10	525	100	1	70	NA	NA	NA
54	Qtz, Fe stns along fractures; limonite-lined vugs after pyrite; jointing strikes N 3°W, dips 85°SW; from small shallow pit NE of shaft.	Select 35.6 cm $8/tonne	945 [0.028 oz/ton]	11	24	263	162	<5	<5	<10	250	<100	1	150	NA	NA	NA
55	Drusy wt qtz vein; hairline fractures lined with Fe- and lesser cinnabar-stns after sulfides; vein strikes N 73°E, dips 68°SE.	Chip 30.5 cm $37/tonne	3975 [0.116 oz/ton]	4.5	22	92	101	<5	<5	<10	80	<100	<1	145	20	52	15
56	Drusy wt qtz vein in altered grn; Fe-stns along fractures, remnant pyrite; vein strikes S 66°E, dips 70°SE.	Chip 30.5 cm	57	2.4	30	82	106	<5	<5	<10	92	<100	<1	130	<20	25	<5
57	Silicified and qtz-flooded medium-grained qtz monzonite; irregular biotite books appear secondary.	Random chip	105	1.0	76	305	352	<5	<5	<10	725	<100	1	25	NA	NA	NA
58	Highly altered and qtz-flooded qtz monzonite; secondary chlorite, lepidolite and pyrite; weathered and vuggy.	Select 30.5 cm	112	1.0	52	102	293	<5	<5	<10	365	<100	1	90	NA	NA	NA
59	Drusy wt qtz vein; hairline fractures lined with Fe stns after sulfides; limonite and epidote lines vugs.	Select 45.7 cm $5/tonne	590 [0.017 oz/ton]	2.6	42	273	288	5	<5	<10	156	<100	1	75	NA	NA	NA
60	Altered grn and mineralized qtz from randomly dug holes in mine dump.	Grab $8/ton]	875 [0.026 oz/ton]	5.5	163	360	1565	<5	<5	27	605	<100	4	325	NA	NA	NA
61	Highly Fe-stained qtz with lesser malachite stain; fractured and vuggy; selected from dump.	Select $8/tonne	832 [0.024 oz/ton]	9.6	995	523	1550	6	<5	25	152	<100	5	230	<20	25	<5
62	Altered grn and mineralized qtz from randomly dug holes in mine dump.	Grab $22/tonne	2215 [0.065 oz/ton]	31	775	1075	5810	5	<5	115	420	<100	4	735	33	82	6
63	Highly Fe-stained qtz; fractured and vuggy; selected from dump.	Select $7/tonne	710 [0.021 oz/ton]	29	280	745	592	8	<5	12	52	<100	13	205	<20	22	<5
64	Olive-, locally bluish-green andesite; joints strike N 62°W, dip 28°NE, and N 90°E, dip 65°S.	Select 6.1 m	95	0.3	88	127	670	<5	<5	15	395	100	1	50	NA	NA	NA
66	Lightly Fe-stained bleached pk grn to qtz monzonite; 10% qtz veins to 1.3-cm-wide; 1.3-cm vein strikes N48°E, dips 80°SE.	Chip every 45 cm for 16.2 m	235	1.5	145	184	377	<5	<5	<10	168	<100	1	135	<20	35	6

TABLE A-1. -- Trace element analyses of samples from the Lime Creek study area, Camas and Elmore Counties, Idaho -- continued

Sample no.	Description	Sample type and length; gold value at $11.25/g	In parts per million, except as noted														
			Au (ppb)	Ag	Cu	Pb	Zn	As	Sb	W	Mn	Ba	Mo	Hg (ppb)	La	Ce	Y
Part II, Rock Samples -- continued:																	
67	Highly Fe- and malachite-stained qtz and grn fragments.	Select $16/tonne	1740 [0.051 oz/ton]	55	2515	2490	2195	7	<5	27	325	<100	10	670	NA	NA	NA
68	Olive green porphyritic andesite; wt andesite phenocrysts to 5 mm long; local Fe-stns.	Select 76 cm	23	0.3	40	39	325	<5	<5	<10	320	105	<1	45	31	80	10
69	Lightly Fe-stained bleached pk grn to qtz monzonite and vein qtz.	Grab	553	1.4	140	265	682	<5	<5	15	510	<100	1	195	NA	NA	NA
70	Lightly Fe-stained bleached pk grn to qtz monzonite; float from sloughed dump area.	do...	12	<0.2	22	<2	72	<5	<5	<10	275	<100	1	25	NA	NA	NA
71	Fe-stained qtz; fractured and vuggy; selected from sloughed dump area.	Select	97	5.8	28	87	66	<5	<5	<10	107	<100	2	110	NA	NA	NA

Table A-2.--Whole rock analyses of samples from the Lime Creek study area, Camas and Elmore Counties, Idaho
[Analyses by plasma emission spectroscopy, except LOI (loss on ignition) by gravimetric analysis]

Map no.	Summary description	Sample type	In percent											
			Al_2O_3	CaO	Fe_2O_3	K_2O	MgO	MnO	Na_2O	P_2O_5	SiO_2	TiO_2	LOI	Totals
7	Silicified porphyritic hornblende granite.	Chip 9.6 m	13.10	0.51	2.01	4.86	0.58	0.031	3.55	0.07	74.32	0.26	0.28	99.57
11	Pink rhyolite dike (6.1-m-wide).	Random chip	11.92	0.12	0.98	4.38	0.09	0.015	3.57	0.04	78.13	0.04	0.18	99.47
18	Kaolinized pinkish white rhyolite.	do..	12.15	0.04	0.86	4.68	0.05	0.006	0.35	0.05	80.12	0.06	1.58	99.95
22	Peach-pink porphyritic rhyolite dike.	do..	11.51	0.12	0.85	3.72	0.07	0.013	4.32	0.05	78.43	0.04	0.32	99.44
23	Medium- to fine-grained diabase dike.	do..	15.03	4.65	7.13	1.97	5.82	0.098	3.48	0.25	57.22	0.75	4.03	100.43
29	Pink rhyolite porphyry dike (9.1-m-wide).	Chip 2.7 m	12.51	0.16	1.03	4.65	0.08	0.026	3.92	0.08	78.13	0.06	0.19	100.84
30	Pink porphyritic granite; probable dike.	Random chip	14.23	1.22	2.81	5.12	0.86	0.041	4.06	0.17	70.55	0.32	0.25	99.63
40	Potassium feldspar and quartz pegmatite.	Grab	10.05	0.33	1.13	3.47	0.01	0.019	3.28	0.01	79.85	0.03	0.85	99.03
43	Light pink, potassically altered granite.	Chip 0.9 m	12.65	0.02	0.45	3.12	0.04	0.013	3.65	0.01	79.18	0.02	0.23	99.38
48	White kaolinized granite.	do..	14.92	0.81	2.86	3.52	1.43	0.043	4.15	0.15	70.58	0.37	1.45	100.28
50	Weathered, brownish orange granite.	Chip 1.5 m	15.41	0.39	2.09	3.95	0.25	0.034	4.38	0.04	72.25	0.25	1.32	100.36
53	Reddish brown quartz monzonite.	Random chip	13.42	0.22	1.64	4.92	0.27	0.053	3.82	0.08	73.65	0.15	0.36	98.58
56	Drusy quartz vein in altered granite.	Chip 0.3 m	4.28	0.01	1.37	1.48	0.19	0.023	0.05	0.03	91.06	0.08	0.25	98.83
57	Silicified medium-grained quartz monzonite.	Random chip	11.85	0.11	1.97	3.62	0.45	0.091	1.73	0.11	78.31	0.21	0.38	98.83
64	Olive-green porphyritic andesite.	Select 0.76 m	15.08	1.04	3.57	3.91	1.72	0.048	3.18	0.12	68.35	0.41	2.75	100.18
66	Pink granite to quartz monzonite; local quartz veins.	Chip 15.2 m	11.02	0.13	1.51	2.68	0.15	0.022	3.56	0.02	80.12	0.07	1.43	100.71

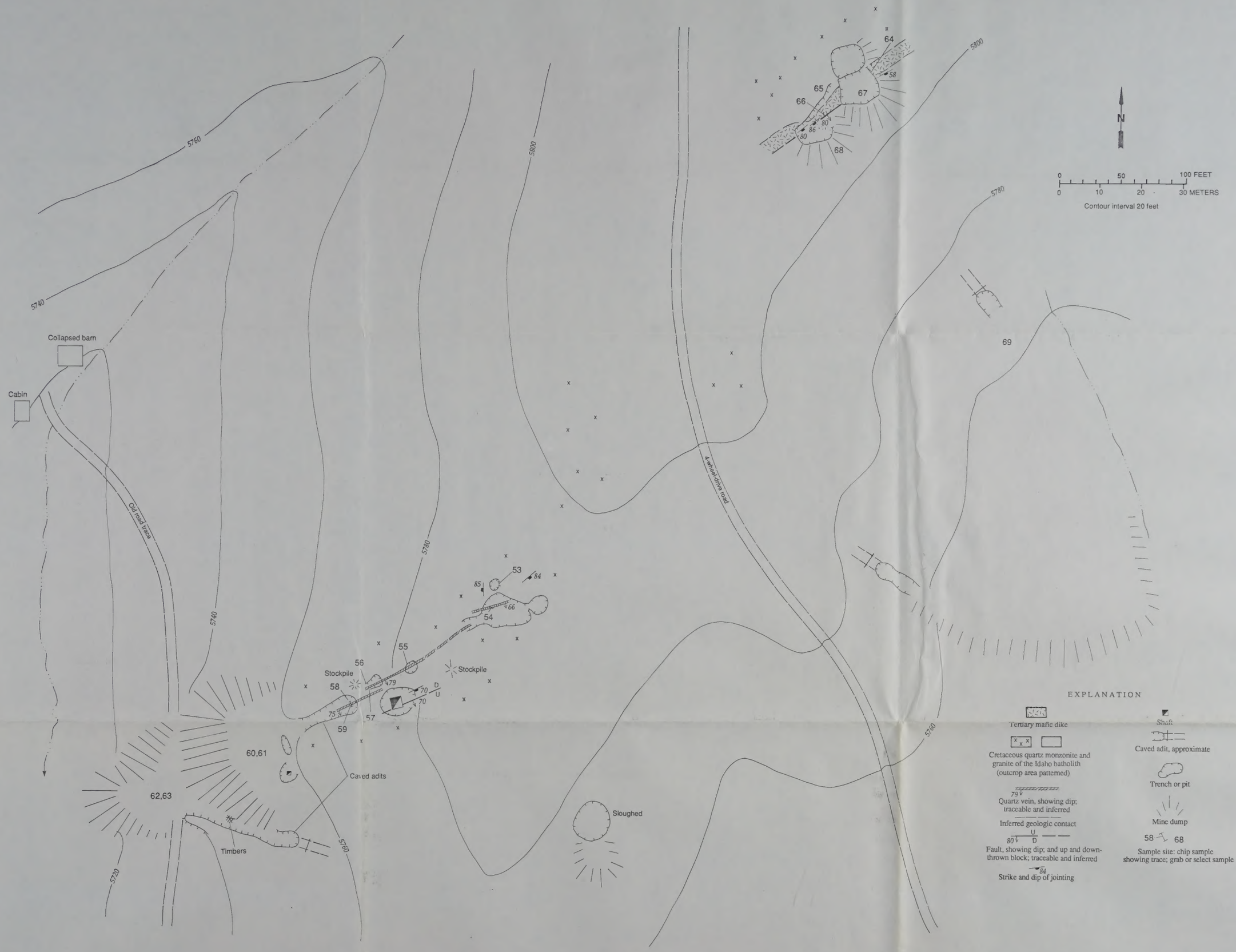
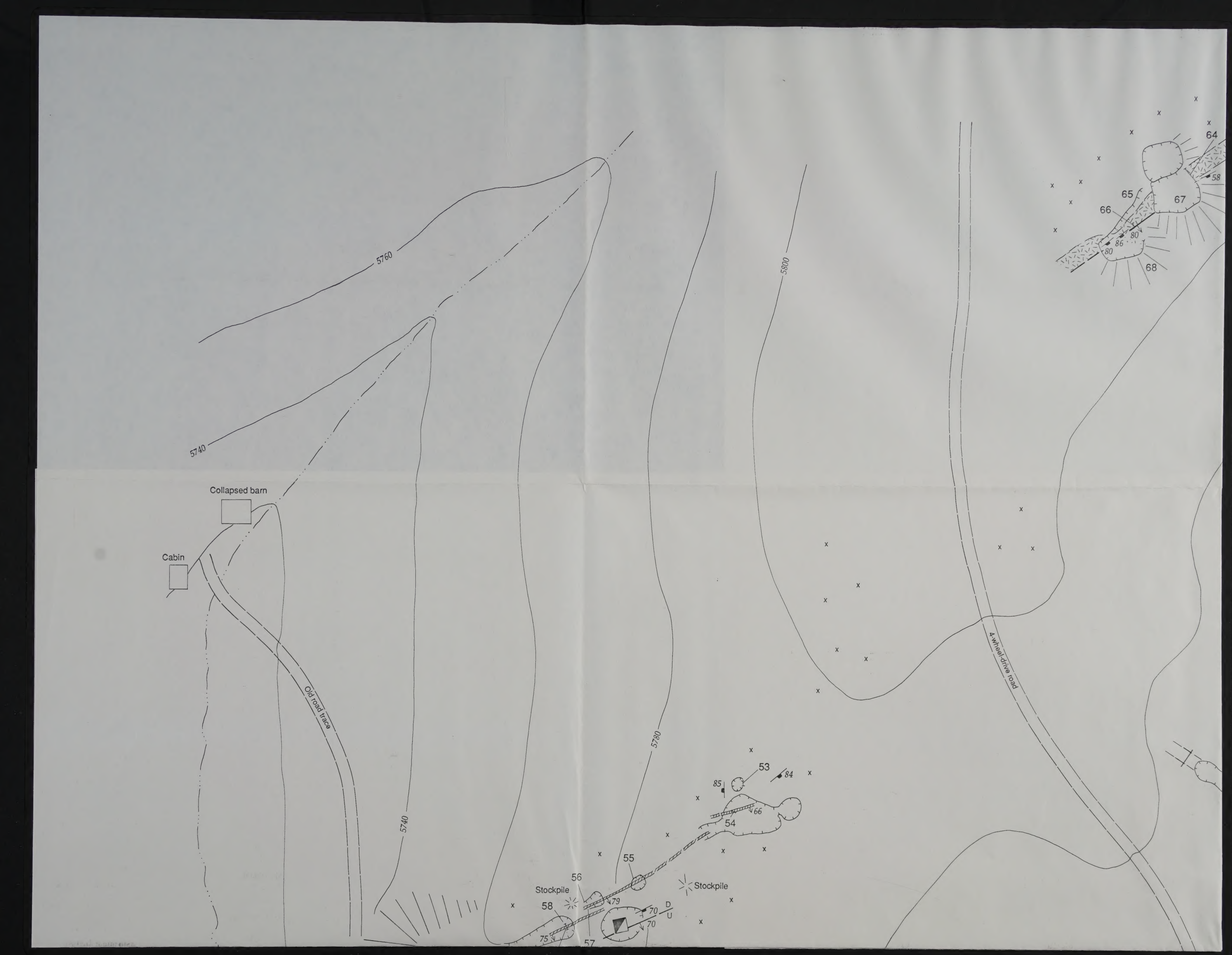
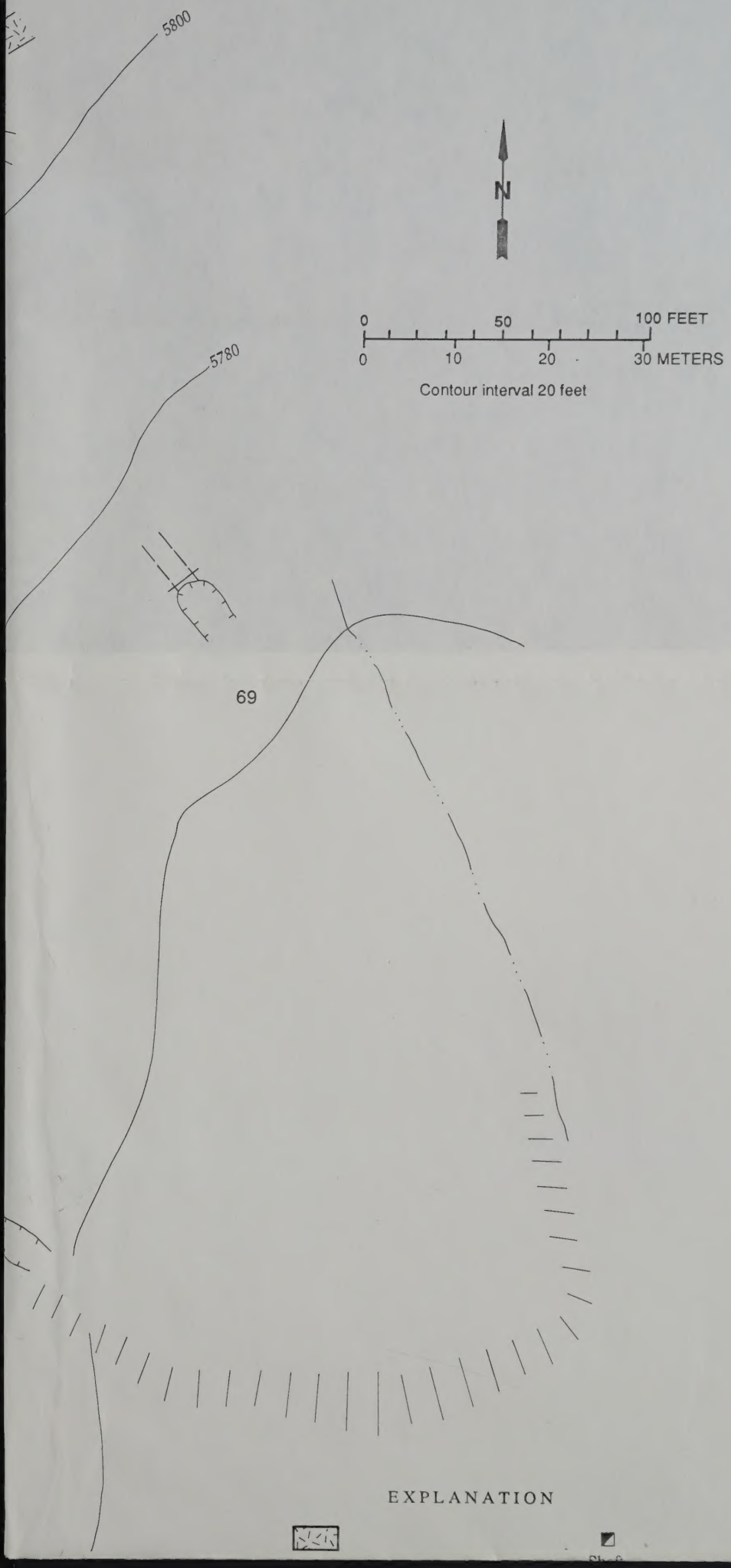


Plate 2.- Geology and sample localities at the President mine, Lime Creek study area, Elmore County, Idaho


5760
5740
5800
5780
5740
Collapsed barn
Cabin
Old road trace
4-wheel drive road
64
65
66
67
68
58
80
86
80
53
84
85
54
66
55
56
Stockpile
58
79
70
70
D
U
75
57
Stockpile


5800
N
0
50
100 FEET
0
10
20
30 METERS
Contour interval 20 feet
5780
69
EXPLANATION

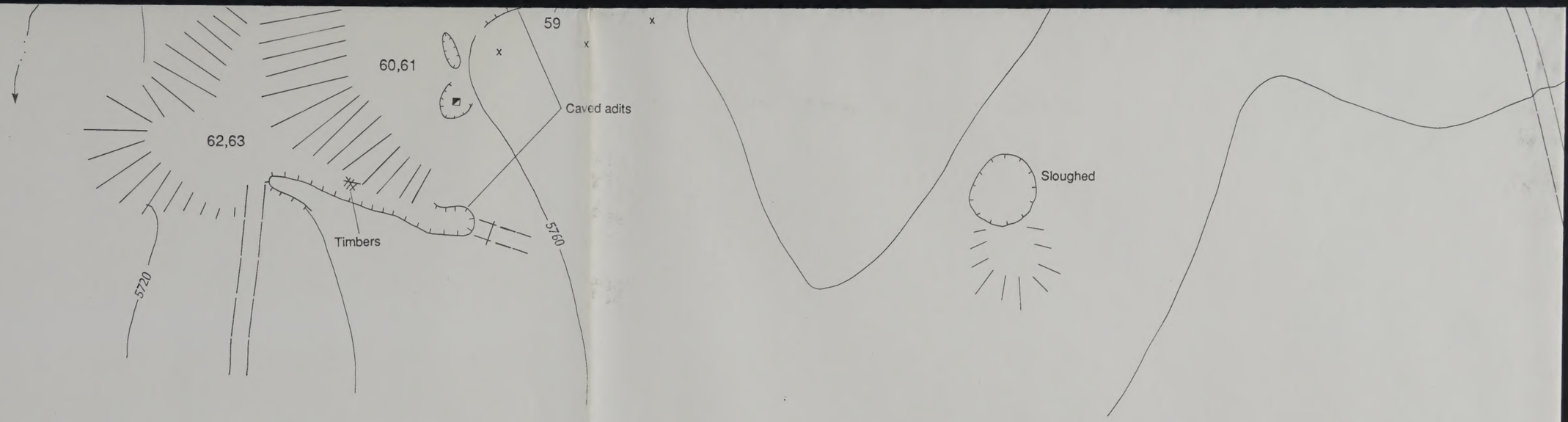
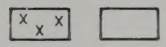


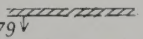
Plate 2.- Geology and sample localities at the President mine, Lime Creek study area, Elmore County, Idaho

5760

Tertiary mafic dike

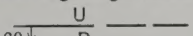


Cretaceous quartz monzonite and granite of the Idaho batholith (outcrop area patterned)



Quartz vein, showing dip; traceable and inferred

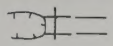
Inferred geologic contact



Fault, showing dip; and up and down-thrown block; traceable and inferred

Strike and dip of jointing

Shaft



Caved adit, approximate

Trench or pit

Mine dump

Sample site: chip sample showing trace; grab or select sample

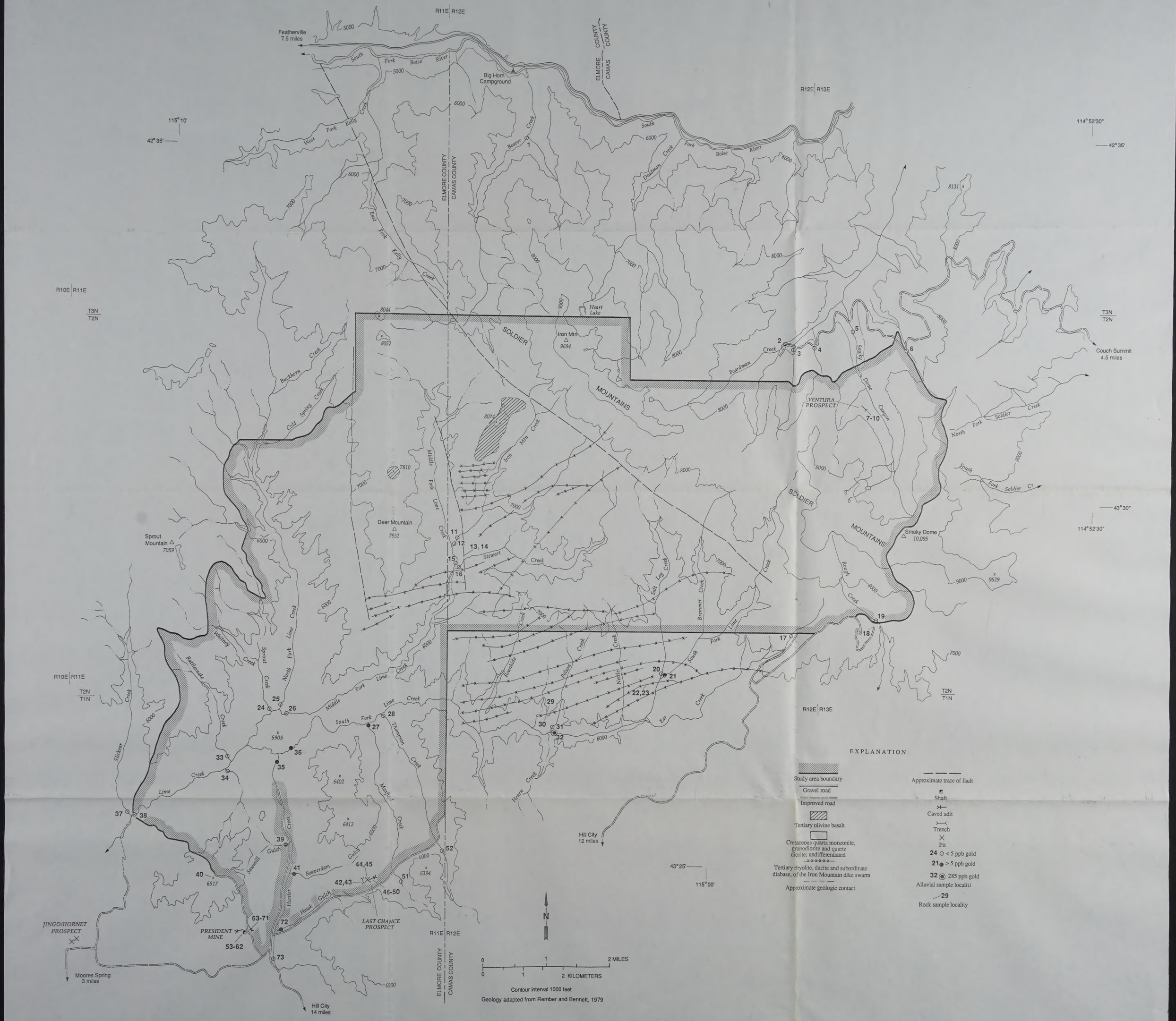


Plate 1.- Sample localities and geology in the Lime Creek study area, Camas and Elmore Counties, Idaho

R11E | R12E

Featherville
7.5 miles

5000

South Fork Boise River

5000

Big Horn
Campground

6000

ELMORE COUNTY
CAMAS COUNTY

115° 10'

42° 35'

West Fork Kelly Creek

Beaver Creek

1

South

6000

Deadman Creek

Fork Boise River

6000

6000

7000

7000

East Fork Kelly Creek

ELMORE COUNTY
CAMAS COUNTY

7000

8000

7000

R10E | R11E

T3N
T2N

8044

9000

Heart
Lake

8052

SOLDIER

Iron Mtn
9694

2

8000

Creek

Buckhorn Creek

Boardman

Cold Spring Creek

MOUNTAINS

8074

8000

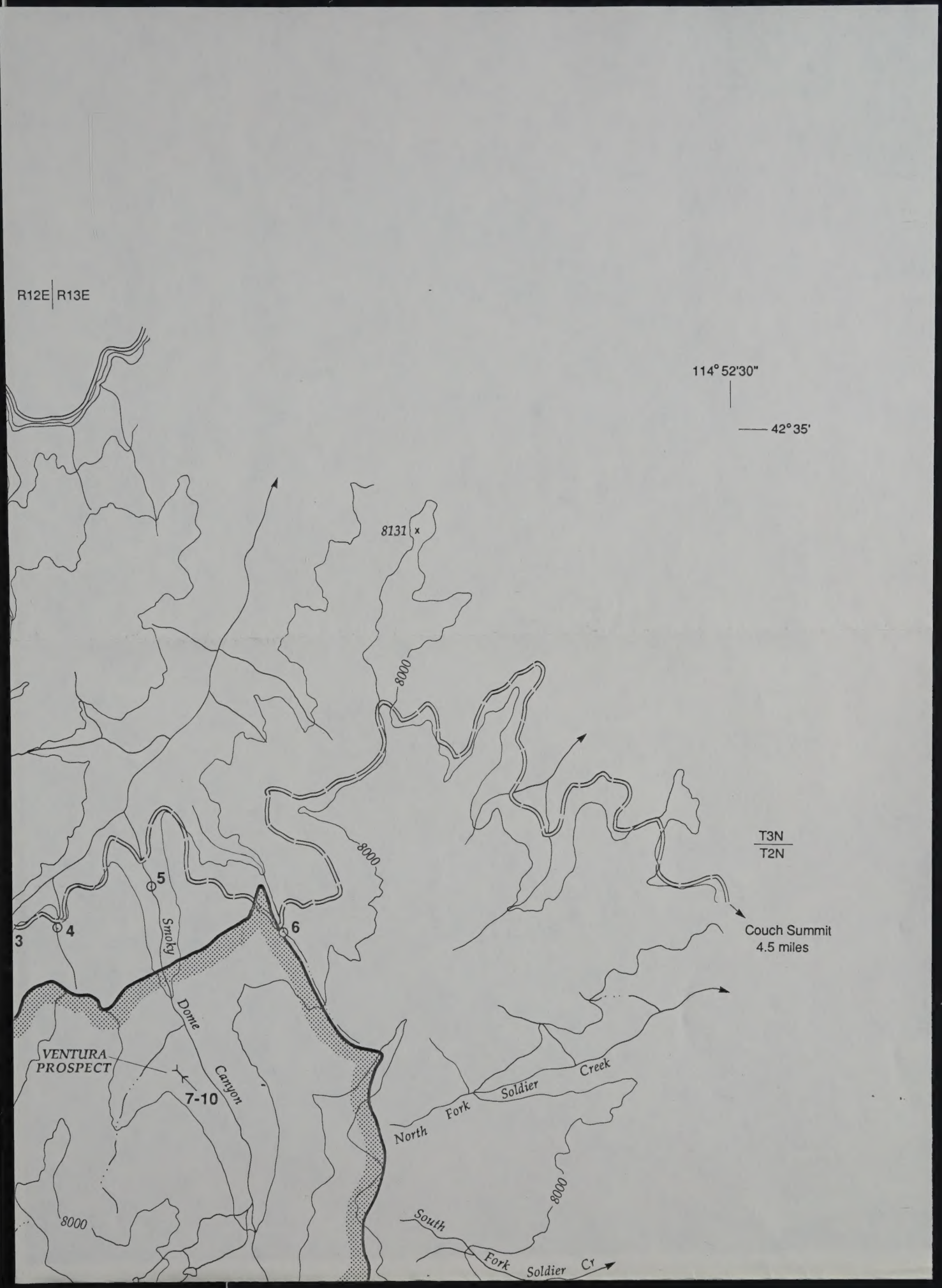
Iron Mtn Creek

Middle Fork

7810

8000

7000


R12E | R13E
114° 52'30"
42° 35'
8131
8000
8000
8000
8000
T3N
T2N
Couch Summit
4.5 miles
3
4
5
6
Smoky
Dome
Canyon
VENTURA
PROSPECT
7-10
North
Fork
Soldier
Creek
South
Fork
Soldier
Cr

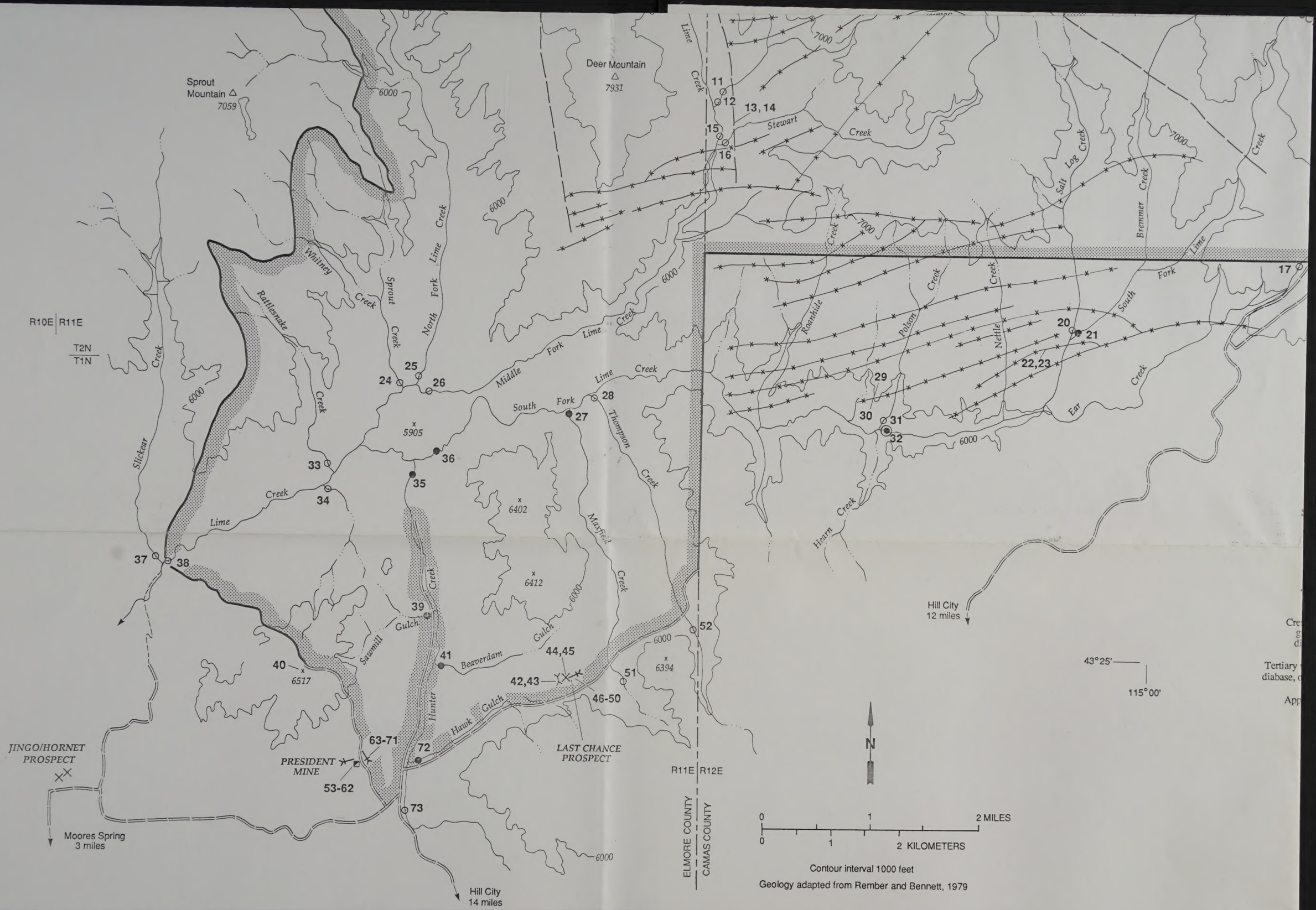
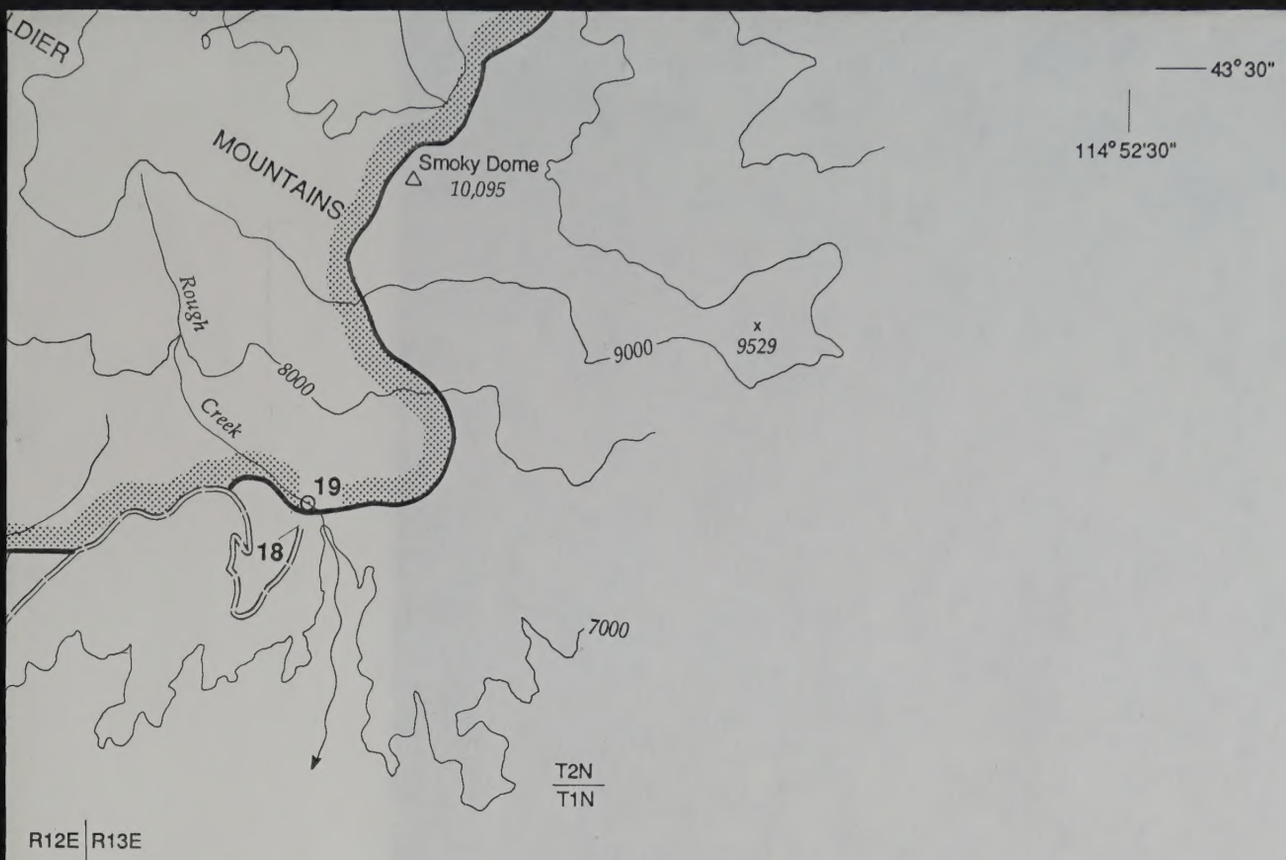


Plate 1.- Sample localities and geology in the Lime Creek study area, Camas and Elmore Counties, Idaho



EXPLANATION

Study area boundary

Gravel road

Improved road

Tertiary olivine basalt

aceous quartz monzonite,
anodiorite and quartz
rite; undifferentiated

hyolite, dacite and subordinate
f the Iron Mountain dike swarm

roximate geologic contact

Approximate trace of fault

Shaft

Caved adit

Trench

Pit

24 ⊙ < 5 ppb gold

21 ◍ > 5 ppb gold

32 ◉ 285 ppb gold

Alluvial sample localiti

29

Rock sample locality